Republic of Yemen

Ministry of Higher Education & Scientific Research

Emirates International University

Faculty of Medicine and Health Sciences

Department of Clinical Pharmacy

Program of Pharm D

Course Specification of

Pharmaceutical Organic Chemistry 1

Course No. (OCH 106)

Prepared by:	Reviewed by:	Head of the Department:	Quality Assurance head	Dean:
Dr. Dr. Mokhtar Al-Ghorafi	Dr. ----			

I. Course Identification and General Information:

1	**Course Title:**	Pharmaceutical Organic Chemistry 1			
2	**Course Code & Number:**	OCH 106			
3	**Credit Hours:**	**Credit Hours**	**Theory Hours**		**Lab. Hours**
			Lecture	**Exercise**	
		3	2	--	2
4	**Study Level/ Semester at which this Course is offered:**	**1st Level / 2nd Semester**			
5	**Pre –Requisite (if any):**	**General chemistry**			
6	**Co –Requisite (if any):**	None			
7	**Program (s) in which the Course is Offered:**	Bachelor of Pharm D			
8	**Language of Teaching the Course:**	English			
9	**Study System:**	Semester based System			
10	**Mode of Delivery:**	Full Time			
11	**Location of Teaching the Course:**	Faculty of medicine and health sciences			
12	**Prepared by:**	Dr. Mokhtar Al-Ghorafi			
13	**Date of Approval:**				

II. Course Description:

This course well subject the students to the basic knowledge of aliphatic compounds, include the physical and chemical properties, chemical reactions, methods of preparation and mechanisms of hydrocarbon ,alkyl halide , alcohol , ethers ,aldehydes , ketones ,carboxylic acid and amine Also providing students with skills related to stereoisomerism of organic compounds, the structural formula and functional groups of pharmaceutical organic compounds.

III. Course Intended Learning Outcomes (CILOs) : (maximum 8) Upon successful completion of the course, students will be able to:		Referenced PILOs Learning out of program		
	A. Knowledge and Understanding:	**I, A or E**		
a1	Identify the basic principle of functional group in aliphatic organic compounds and synthesis according to their knowledge in functional group and reaction mechanism			A1
a2	Describe the systematic methods of identification, synthesis of various classes of organic compounds, and their application in the synthesis of simple medicinal agents.			A1,A3
	B. Intellectual Skills:			
b1	Interpret the methods of synthesis , properties of medicinal agents.and critical problems that may be encountered in pharmaceutical organic chemistry applications.			B1
b2	Select a suitable methods for preparation, isolation, purification, identification of organic compounds			B1
	C. Professional and Practical Skills:			
c1	Handle basic laboratory equipments and chemicals effectively and safely.			C1
c2	Perform the analysis of functional groups of pharmaceutical organic compounds.			C 3
	D. Transferable Skills:			
d1	Work effectively as part of a team to collect data and/or produce reports and Presentation			D3

d 2	Work efficiently in scientific research with team work			D3

(A) Alignment of Course Intended Learning Outcomes (Knowledge and Understanding) to Teaching Strategies and Assessment Methods:			
	Course Intended Learning Outcomes	**Teaching Strategies**	**Assessment Strategies**
a1	Identify the basic principle of functional group in aliphatic organic compounds and synthesis according to their knowledge in functional group and reaction mechanism	Lectures Presentation	-Quizzes -Midterm Exam -Final Written Exam
a2	Describe the systematic methods of identification, synthesis of various classes of organic compounds, and their application in the synthesis of simple medicinal agents.	Lectures Presentation	-Quizzes -Midterm Exam -Final Written Exam
(B) Alignment of Course Intended Learning Outcomes (Intellectual Skills) to Teaching Strategies and Assessment Methods:			
	Course Intended Learning Outcomes	**Teaching Strategies**	**Assessment Strategies**
b1	Interpret the methods of synthesis , properties of medicinal agents.and critical problems that may be encountered in pharmaceutical organic chemistry applications.	-Lectures - Discussion	-Quizzes -Midterm Exam -Final Exam
b2	Select a suitable methods for preparation, isolation, purification, identification of organic compounds	-Lectures - Discussion	- Quizzes -Midterm Exam -Final Exam
(C) Alignment of Course Intended Learning Outcomes (Professional and Practical Skills) to Teaching Strategies and Assessment Methods:			
	Course Intended Learning Outcomes	**Teaching Strategies**	**Assessment Strategies**

c1	Handle basic laboratory equipments and chemicals effectively and safely.	▪ Lectures. ▪ Lab Experiments	▪ laboratory and other written reports ▪ Quizzes ▪ Final Practical Exam
c2	Perform the analysis of functional groups of pharmaceutical organic compounds.	▪ Lectures. ▪ Lab Experiments	▪ laboratory and other written reports ▪ Quizzes ▪ Final Practical Exam

(D) Alignment of Course Intended Learning Outcomes (Transferable Skills) to Teaching Strategies and Assessment Methods:

Course Intended Learning Outcomes		Teaching Strategies	Assessment Strategies
d1	Work effectively as part of a team to collect data and/or produce reports and Presentation	▪ Group learning ▪ Problem-based ▪ Self-learning	▪ Discussion. ▪ Group work
d2	Work efficiently in scientific research with team work	▪ Use of communication and information technology ▪ Self-learning	▪ Discussion. ▪ Group work

IV. Course Contents:

A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	Introduction to Pharmaceutical Organic Compounds: The fundamentals of Pharmaceutical Organic Chemistry	Introduction, solubility , type of chemical bonds, -hybidization and their types chemical bonding in drug–receptor interactions -Representation of organic compounds, type of isomerism, electronic effects (inductive & resonance), and Steric effect -Types chemical bond cleavage The effect of cleavage of bond in drug stability	1	2	a1,a2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
		Applications in physical and chemical properties of drugs			
2	Organic reaction	-Type of organic reactions, and type of their mechanisms Substitution -Addition -Elimination -Types of reagents	1	2	b2
3	Alkanes	-- nomenclature, preparations, and reaction properties), and free radical substitution reaction mechanism. Pharmaceutical importance of alkan (action , activity ,stability and metabolism)	1	2	a1,a2
4	Alkenes	Alkenes and cycloalkenes (nomenclature, preparations, and reaction properties), and elimination & addition reaction mechanism Pharmaceutical importance of alken (Isomer , activity ,stability and metabolism) Therapeutical applications	2	4	a1,a2,b1, b2
5	Alkynes	Alkynes (nomenclature, preparations, and properties), acidity of acetylene physical and chemical properties of alkyne group in drug structure Therapeutical applications	1	2	a1,a2,b1
6	Organic halides	Alkyl halides (nomenclature, preparations, and properties), Nucleophilic substitution reactions mechanism, and reactions of	1	2	a1,a2,b1

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
		organometallic compounds. Pharmaceutical importance of alkyl halide in drug synthesis Therapeutical applications			
7	Midterm		1		a1,a2,b1, b2
8	Alcohols	- Alcohols (nomenclature, preparations, and properties), esterification reaction mechanisms – Ethers (nomenclature, preparations, and properties) physical and chemical properties of drugs contain alcohol functional gro up(prodrug and metabolism) Therapeutical applications	1	2	a1,a2,b1, b2
9	Aldehydes and k etones	Aliphatic aldehydes & Ketones (nomenclature, preparations, and properties), Addition, condensation (Aldol) reaction mechanism, and cannizaro reaction Pharmaceutical importance of Aliph atic aldehydes & Ketones in synthesis and stbility of drugs	2	4	a1,a2,b1, b2
10	Carboxylic acid	Aliphatic carboxylic acids (nomenclature, preparations, and properties), factors affecting on the acidity of drugs	1	2	a1,a2,b1, b2
11	Derivatives of car boxylic acid	-Acyl halides -Anhydride -Esters -Amides	1	2	a1,a2,b1, b2,d1

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
		Stability of drugs containing one or m ore of that compounds **Therapeutical applications**			
12	Aliphatic amines	Aliphatic amines (nomenclature, preparations, and properties), factors affecting on the bacidity of drugs **Therapeutical applications**	1	2	a1,a2,b1, b2
13	**Final Theoretical Exam**	-MCQs and essay questions	1	2	a1,a2,b1, b2
Number of Weeks /and Units Per Semester			16	32	

B. Case Studies and Practical Aspect:

No.	Tasks/ Experiments	Week Due	Contact Hours	Learning Outcomes (CILOs)
1	Laboratory safety	1	2	a1,
2	Test of alkene	1	2	c1,c2,d1
3	Test of alcohols	1	2	c1,c2,d1
4	Test of aldehydes	1	2	c1,c2,d1
5	Test of ketones	1	2	c1,c2,d1
6	Test of acids	1	2	c1,c2
7	Test of acid derivatives	1	2	c1,c2
8	Test of amines	1	2	c1,c2
9	Test of ammonium salt	2	4	c1,c2
10	Lassaigne's test, test for nitrogen	1	2	c1,c2

No.	Tasks/ Experiments	Week Due	Contact Hours	Learning Outcomes (CILOs)
11	Test for sulfur	1	2	c1,c2
12	Test for halogen in absence of nitogen and sulfur	1	2	c1,c2
13	Revision	1	2	c1,c2
14	Final exam	1	2	c1,c2,d1
Number of Weeks /and Units Per Semester		**15**		

V. Teaching Strategies of the Course:

- Lectures
- Presentation
- Discussion
- Lab Experiments
- Group learning
- Problem-based
- Self-learning
- Use of communication and information technology

VI. Assessment Methods of the Course:

- - Final examinations,
- Quizzes
- Practical laboratory test
- Discussion.
- Group work

VII. Assignments:

No.	Assignments	Week Due	Mark	Aligned CILOs (symbols)

No.	Assignments	Week Due	Mark	Aligned CILOs (symbols)
1	**Assignments :** Searching about related subjects of functional groups in drug activity	10th	5	a1,a2,b2,d2
Total			**5**	

VIII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Assignments	10th	5	5 %	a1,a2,b2,d2
2	Quiz	6th	5	5 %	a1,a2,b1,c1,c2
3	Mid-Term Theoretical Exam	8th	20	20 %	a1,a2,b1,b2
4	Final Practical Exam	15th	20	20 %	c1,c2,d1
5	Final Theoretical Exam	16th	50	50 %	a1,a2,b1,b2,
Total			100	100%	

IX. Learning Resources:

- *Written in the following order:* Author, Year of publication, Title, Edition, Place of publication, Publisher.

1- Required Textbook(s) (maximum two):

1- Bruice, Paula Yurkanis. 2004. Organic chemistry. 8th ed, Upper Saddle River, NJ: Pearson/Prentice Hall. Harvard.

2.Paul M. Dewick.2015, For Students of Pharmacy, Medicinal Chemistry and Biological Chemistry ,3rd School of Pharmacy,University of Nottingham, UK

2- Essential References:

1.SOLOMONS, T. W. G., & FRYHLE, C. B. (2017). Organic chemistry. Hoboken, NJ, John Wiley , 12th edition.

2.McMurry, J. (2008) Organic Chemistry. 7th Edition, Thomson Brooks Cole

3- Electronic Materials and Web Sites etc.:

Websites: https://www.khanawww.pubmed.com http://www.sciencedirect.com https://www.khanacademy.org/science/organic-chemistry

X. Course Policies: (Based on the Uniform Students' By law (2007)	
1	**Class Attendance:** Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.
2	**Tardiness:** A student will be considered late if he/she is not in class after 10 minutes of the start time of class.
3	**Exam Attendance/Punctuality:**

	No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.
4	**Assignments & Projects:** Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	**Cheating:** Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	**Forgery and Impersonation:** Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
7	**Other policies:** The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.

Faculty of Medicine and Health science

Department of Clinical Pharmacy

Program of Pharm D

Course Plan (Syllabus) of

Pharmaceutical Organic Chemistry I

Course No. (OCH 106)

I. Information about Faculty Member Responsible for the Course:								
Name of Faculty Member:	Mokhtar Al-Ghorafi	Office Hours						
Location& Telephone No.:	770010749							
E-mail:	Alghorafi2030@yahoo.com	SAT	SUN	MON	TUE	WED	THU	

II. Course Identification and General Information:

1	**Course Title:**	Pharmaceutical Organic Chemistry 1			
2	**Course Code & Number:**	OCH 106			
3	**Credit Hours:**	**Credit Hours**	**Theory Hours**		**Lab. Hours**
			Lecture	**Exercise**	
		3	2	--	2
4	**Study Level/ Semester at which this Course is offered:**	1st Level / 2nd Semester			
5	**Pre –Requisite (if any):**	General **chemistry**			
6	**Co –Requisite (if any):**	None			
7	**Program (s) in which the Course is Offered:**	Bachelor of Pharm D			
8	**Language of Teaching the Course:**	English			
9	**Study System:**	Semester based System			
10	**Mode of Delivery:**	Full Time			
11	**Location of Teaching the Course:**	Faculty of medicine and health sciences			
12	**Prepared by:**	Dr. Mokhtar Al-Ghorafi			
13	**Date of Approval:**				

III. Course Description:

This course well subject the students to the basic knowledge of aliphatic compounds, include the physical and chemical properties, chemical reactions, methods of preparation and mechanisms of hydrocarbon ,alkyl halide , alcohol , ethers ,aldehydes , ketones ,carboxylic acid and amine Also providing students with skills related to stereoisomerism of organic compounds, the structural formula and functional groups of pharmaceutical organic compounds.

IV. Course Intended Learning Outcomes (CILOs) :

Upon successful completion of the Course, student will be able to:

	A. **Knowledge and Understanding:**
a1	Identify the basic principle of functional group in aliphatic organic compounds and synthesis according to their knowledge in functional group and reaction mechanism
a2	Describe the systematic methods of identification, synthesis of various classes of organic compounds, and their application in the synthesis of simple medicinal agents.
	B. **Intellectual Skills:**
b1	Interpret the methods of synthesis , properties of medicinal agents.and critical problems that may be encountered in pharmaceutical organic chemistry applications.
b2	Select **a suitable methods** for preparation, isolation, purification, identification of organic compounds
	C. **Professional and Practical Skills:**
c1	Handle basic laboratory equipments and chemicals effectively and safely.
c2	**Perform the analysis of functional groups** of pharmaceutical organic compounds.
	D. **Transferable Skills:**
d1	Work effectively as part of a team to collect data and/or produce reports and Presentation
d 2	**Work efficiently in scientific** research with team work

V. Course Contents:

A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
1	**Introduction to Pharmaceutical Organic Compounds: The fundamentals of Pharmaceutical Organic Chemistry**	– Introduction, **solubility , type of chemical bonds, -hybidization and their types chemical bonding in drug–receptor interactions** – -Representation **of organic compounds, type of isomerism, electronic effects (inductive & resonance), and Steric effect** – -Types **chemical bond cleavage**	1	2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
		– The effect of cleavage of bond in drug stability Applications in physical and chemical properties of drugs		
2	Organic reaction	– -Type of organic reactions, and type of their mechanisms Substitution -Addition -Elimination -Types of reagents	1	2
3	Alkanes	– -- nomenclature, preparations, and reaction properties), and free radical substitution reaction mechanism. *Pharmaceutical importance of alkan* (act ion , activity ,stability and metabolism)	1	2
4	Alkenes	– Alkenes and cycloalkenes (nomenclature, preparations, and reaction properties), and elimination & addition reaction mechanis m Pharmaceutical importance of alken (Iso mer , activity ,stability and metabolism) Therapeutical applications	2	4
5	Alkynes	– Alkynes (nomenclature, preparations, and properties), acidity of acetylene physical and chemical properties of alky ne group in drug structure Therapeutical applications	1	2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
6	Organic halides	Alkyl halides (nomenclature, preparations, and properties), Nucleophilic substitution reactions mechanism, and reactions of organometallic compounds. Pharmaceutical importance of alkyl halide in drug synthesis Therapeutical applications	1	2
7	Midterm	–	1	
8	Alcohols	– - Alcohols (nomenclature, preparations, and properties), esterification reaction mechanisms – Ethers (nomenclature, preparations, and properties) physical and chemical properties of dru gs contain alcohol functional group(prod rug and metabolism) Therapeutical applications	1	2
9	Aldehydes and ketones	– Aliphatic aldehydes & Ketones (nomenclature, preparations, and properties), Addition, condensation (Aldol) reaction mechanism, and cannizaro reaction Pharmaceutical importance of Aliphatic aldehydes & Ketones in synthesis and stbi lity of drugs	2	4
10	Carboxylic acid	– Aliphatic carboxylic acids (nomenclature, preparations, and properties), factors affecting on the	1	2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
		acidity of drugs		
11	Derivatives of carboxylic acid	– -Acyl halides -Anhydride -Esters -Amides Stability of drugs containing one or more o f that compounds Therapeutical applications	1	2
12	Aliphatic amines	Aliphatic amines (nomenclature, preparations, and properties), factors affecting on the bacidity of drugs Therapeutical applications	1	2
13	Final Theoretical Exam	-MCQs and essay questions	1	2
Number of Weeks/and Units Per Semester	16	32		

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
1	Introduction to Pharmaceutical	Introduction, solubility , type of chemical bonds, -hybidization and their types	1	2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
	Organic Compounds: The fundamentals of Pharmaceutical Organic Chemistry	chemical bonding in drug–receptor interactions -Representation of organic compounds, type of isomerism, electronic effects (inductive & resonance), and Steric effect -Types chemical bond cleavage The effect of cleavage of bond in drug stability Applications in physical and chemical properties of drugs		
2	Organic reaction	-Type of organic reactions, and type of their mechanisms Substitution -Addition -Elimination -Types of reagents	1	2
3	Alkanes	-- nomenclature, preparations, and reaction properties), and free radical substitution reaction mechanism. Pharmaceutical importance of alkan (act ion , activity ,stability and metabolism)	1	2
4	Alkenes	Alkenes and cycloalkenes (nomenclature, preparations, and reaction properties), and elimination & addition reaction mechanism Pharmaceutical importance of alken (Iso mer , activity ,stability and metabolism) Therapeutical applications	2	4
5	Alkynes	Alkynes (nomenclature, preparations, and properties), acidity of acetylene physical and chemical properties of alky ne group in drug structure Therapeutical applications	1	2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
6	Organic halides	Alkyl halides (nomenclature, preparations, and properties), Nucleophilic substitution reactions mechanism, and reactions of organometallic compounds. Pharmaceutical importance of alkyl halide in drug synthesis Therapeutical applications	1	2
7	Midterm		1	
8	Alcohols	- Alcohols (nomenclature, preparations, and properties), esterification reaction mechanisms – Ethers (nomenclature, preparations, and properties) physical and chemical properties of drugs contain alcohol functional group(prodrug and metabolism) Therapeutical applications	1	2
9	Aldehydes and ketones	Aliphatic aldehydes & Ketones (nomenclature, preparations, and properties), Addition, condensation (Aldol) reaction mechanism, and cannizaro reaction Pharmaceutical importance of Aliphatic aldehydes & Ketones in synthesis and stbility of drugs	2	4
10	Carboxylic acid	Aliphatic carboxylic acids (nomenclature, preparations, and properties), factors affecting on the acidity of drugs	1	2
11	Derivatives of carboxylic acid	-Acyl halides -Anhydride -Esters	1	2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
		-Amides Stability of drugs containing one or more of that compounds Therapeutical applications		
12	Aliphatic amines	Aliphatic amines (nomenclature, preparations, and properties), factors affecting on the bacidity of drugs Therapeutical applications	1	2
13	Final Theoretical Exam	-MCQs and essay questions	1	2
Number of Weeks /and Units Per Semester			16	32

B. Case Studies and Practical Aspect:

No.	Tasks/ Experiments	Week Due	Contact Hours
1	Laboratory safety	1	2
2	**Test** of alkene	1	2
3	**Test** of alcohols	1	2
4	**Test** of aldehydes	1	2
5	**Test** of ketones	1	2
6	**Test** of acids	1	2
7	**Test** of acid derivatives	1	2
8	**Test** of amines	1	2
9	**Test** of ammonium salt	2	4
10	**Lassaigne**'s test, test for nitrogen	1	2

No.	Tasks/ Experiments	Week Due	Contact Hours
11	**Test** for sulfur	1	2
12	**Test** for halogen in absence of nitogen and sulfur	1	2
13	**Revision**	1	2
14	**Final** exam	1	2
Number of Weeks /and Units Per Semester	15		

No.	Tasks/ Experiments	Week Due	Contact Hours
1	Laboratory safety	1	2
2	Test of alkene	1	2
3	Test of alcohols	1	2
4	Test of aldehydes	1	2
5	Test of ketones	1	2
6	Test of acids	1	2
7	Test of acid derivatives	1	2
8	Test of amines	1	2
9	Test of ammonium salt	2	4
10	Lassaigne's test, test for nitrogen	1	2
11	Test for sulfur	1	2
12	Test for halogen in absence of nitogen and sulfur	1	2
13	Revision	1	2
14	Final exam	1	2
Number of Weeks /and Units Per Semester		15	

VI. Teaching Strategies of the Course:

Lectures

Presentation

- Discussion
- Lab Experiments
- Group learning
- Problem-based
- Self-learning
- Use of communication and information technology

VII. Assessment Methods of the Course:

- Final examinations,
- Quizzes
- Practical laboratory test
- Discussion.
- Group work

VIII. Assignments:

No.	Assignments	Week Due	Mark
1	**Assignments : Searching** about related subjects of functional groups in drug activity	10th	5
Total	**5**		

IX. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1	Assignments	10th	5	5 %
2	Quiz	6th	5	5 %

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
3	Mid-Term Theoretical Exam	8th	20	20 %
4	Final Practical Exam	15th	20	20 %
5	Final Theoretical Exam	16th	50	50 %
Total	100			100%

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1	Assignments	10th	5	5 %
2	Quiz	6th	5	5 %
3	Mid-Term Theoretical Exam	8th	20	20 %
4	Final Practical Exam	15th	20	20 %
5	Final Theoretical Exam	16th	50	50 %
Total			100	100%

X. Learning Resources:

- *Written in the following order: Author, Year of publication, Title, Edition, Place of publication, Publisher.*

1- Required Textbook(s) (maximum two):

1- Bruice, Paula Yurkanis. 2004. Organic chemistry. 8th ed, Upper Saddle River, NJ: Pearson/Prentice Hall. Harvard.

1- 2.Paul M. Dewick.2015, For Students of Pharmacy, Medicinal Chemistry and Biological Chemistry,3rd School of Pharmacy,University of Nottingham, UK

2- Essential References:

2- 1.SOLOMONS, T. W. G., & FRYHLE, C. B. (2017). Organic chemistry. Hoboken, NJ, John Wiley , 12th edition.

1- 2.McMurry, J. (2008) Organic Chemistry. 7th Edition, Thomson Brooks Cole

3- Electronic Materials and Web Sites etc.:

Websites:

2- https://www.khanawww.pubmed.com

3- http://www.sciencedirect.com

https://www.khanacademy.org/science/organic-chemistry

XI. Course Policies: (Based on the Uniform Students' Bylaw (2007)

1	**Class Attendance:** Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.
2	**Tardiness:**

	A student will be considered late if he/she is not in class after 10 minutes of the start time of class.
3	**Exam Attendance/Punctuality:** No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.
4	**Assignments & Projects:** Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	**Cheating:** Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	**Forgery and Impersonation:** Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
7	**Other policies:** The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.